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# An Eastern American Freshwater Mussel, *Anodonta*, Introduced into Arizona

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(Plate 28)

In studying the freshwater mussels (Unionidae) in the collection of the California Academy of Sciences, San Francisco, I noticed three conspicuously different specimens among the western American *Anodonta*. Though evidently juvenile, they showed inflated beaks and double-looped beak-sculpture with nodes on the postero-ventral angles of the loops. These features showed that the species belongs to the subgenus *Pyganodon* (native only in North America east of the continental divide), whereas the few western American forms belong to *Anodonta* (s. s.) and have flatter beaks with more subdued sculpture. Through the courtesy of Leo G. Hertlein and Allyn G. Smith of the Academy. I was able to bring the shells to the University of Michigan and obtain a more precise identification from Henry van der Schalie of the Museum of Zoology. These specimens are significant not simply in documenting another species in the Pacific Coast drainage, but in showing the difficulties of establishing a mussel outside the area of its native range.

The three specimens are paired valves. all collected recently dead, now catalogued as California Academy of Sciences 38846. They were collected in Lake Mary, T. 20 N., R. 8 E., Coconino County, Arizona, about ten miles southeast of Flagstaff, by A. G. Smith, 11-IV-1955. The lake is a long, narrow, shallow body of water that is partly the result of artificial dams; it is subject to seasonal fluctuation that had left the *Anodonta* stranded. Whether the species still lives in the area is not known. Smith recognized the clams were worth special search but could find only three. Measurements of the specimens (in millimeters) follow:

| Specimen | Length | Width | Height |
|---|---|---|---|
| 1 | 33 | 11 | 20 |
| 2 | 25 | 10 | 16 |
| 3 | 20 | 7 | 12 |

[1] Contribution No. 5, Western American Freshwater Mollusks Program, Institute of Malacology.

Specimens as young as these are not readily identified in a genus as variable as *Anodonta*, but Dr. van der Schalie believes they are referable to *A. corpulenta* Cooper, or a closely related species. According to F. C. Baker (1928: 169) *A. corpulenta* is widespread in the Missouri and Mississippi River drainages, and a known natural host of the glochidial stage is the skipjack herring, *Alosa (Pomolobus) chrysochloris.* Knowledge of the life history of mussels and of their host specificity is so sparse that one cannot infer this *Anodonta* passes its larval life in only this one species of fish.

Seemingly the only plausible explanation for the occurrence of this eastern *Anodonta* in Arizona is that it was introduced in the larval stage (glochidium) on fishes. Various species of eastern American fishes have been introduced often into Arizona, and specifically in the region around Flagstaff (Miller & Lowe, 1964). No one introduction can be cited as responsible for the *Anodonta* since its range of host specificity is unknown; the one established host, *Alosa chrysochloris,* is almost surely not the fish responsible in this case.

In spite of the thousands of intentional transplants of fishes from eastern America to the west, this is the only known case in which a mussel has been introduced along with the fishes. This is powerful testimony to the difficulty of accounting for any part of mussel distribution by passive dispersal. Coupled with the complex life cycle of mussels, and the observed correlation of distributional patterns with present or known former stream drainages, this occurrence in Arizona emphasizes that the geographic distribution of mussels is determined both by present-day biological factors, and the past continuity of their complex environment through geologic time. This conclusion has been expressed previously by van der Schalie (1945, 1963) on the basis of studies mainly in the eastern United States, but obviously is of more general application.

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